§KS584.00 Design Criteria

Design in accordance with the criteria listed in NEM §KS523.01 and the Kansas Standard and Specifications for Irrigation Land Leveling-464. The design should also conform to the instructions outlined in the Kansas Irrigation Guide for gravity irrigation systems and follow the format of the overall Irrigation Development Plan for the operating unit. Refer to Part 4 and 9 of the Kansas Irrigation Guide for design procedures and aids.

§KS584.01 Surveys

(a) The field will be grid-staked. Except for special cases, the grid will be laid out on 100-foot by 100-foot spacing. All significant fringe areas will be included in the staking. Where possible, stake the grid so that all short stations or fringe areas are located on one or two sides of the field. This will simplify computations. Refer to Form KS-ENG-389, Setting Stakes for Land Leveling Operations, for further information.

(b) Record leveling notes on loose-leaf field notebook sheets (Forms SCS-ENG-28 and SCS-ENG-29), field notes sheets (Forms KS-ENG-37 and KS-ENG-37a), or plane surface design sheets (Form KS-ENG-24). Refer to sample notes in this part for note keeping format.

(c) Set at least one permanent bench mark. Set reference hubs as needed.

(d) Take shots at significant points on any fringe areas and record horizontal dimensions referenced to a known grid point.

(e) Take shots on any significant highs or lows in the field that occur between the grid stakes. Record the location of these by referencing to a known grid point.

§KS584.02 Design

(a) Develop the design in accordance with the criteria listed in §KS584.00.

If the design is done manually, prepare a land leveling map and list the following:

(1) Original ground elevation, planned or design elevation, and cut or fill at each grid point. Refer to Part 9 of the Kansas Irrigation Guide for an explanation of leveling map format.

(2) Draw in fringe areas with elevations at signficant points.

(3) Bench mark data, hubs, and map scale.

(4) Water delivery elevation and location if gravity outlet.

(5) Direction of irrigation.

(6) Water distribution system (open ditch, buried, or gated pipe) and also any water control structures that are needed.

(7) Drainage system including any needed structures.

(8) Prepare a table with headings for field number or letter, area in acres, cut yardage, fill yardage, percentage of cut to fill ratio, and cubic yards per acre for each field. The bottom line of the table should be a sum of the totals for the entire area being leveled. Yardage can be computed using the 4-point method or the computer program for Plane Surface Design.

(9) Draw in and label field benches.

(10) Show location of any buried utilities and make notations, if needed, as to depth of cut or other pertinent information.

(b) The Plane Surface Design computer program may also be used for land leveling design. Presently, only a PC version is available. Refer to the program documentation for instructions. It is recommended that field notes be recorded on Form KS-ENG-24 in order to expedite data entry.

§KS584.03 Layout

Mark the cuts and fills on the grid stakes using the leveling map as a reference. This may be done by anyone adequately trained under SCS supervision.

§KS584.04 Land Leveling Checkout

(a) Refer to the sample leveling notes in §KS584.07. Checkout tolerance shall not exceed plus or minus 0.1 foot from the design elevation with no reverse grade in the direction of irrigation.

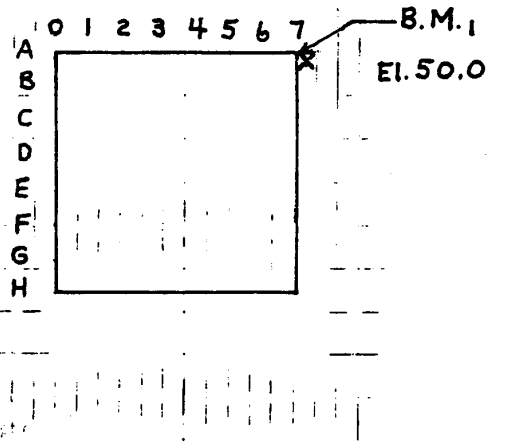
(b) The person doing the checkout should sign and date the land leveling map, certifying that the completed job conforms to the original design and is within the allowable tolerances.

§584.05 Sample of Form SCS-ENG-28, field notes for grid survey and construction checkout.

Seward County 8-18-81
Liberal, Kansas
R.E. Wilson

Irrigation Land Leveling

3



Legal Description

SE4 4 T 34S R 33W

(KS210-KNKDM, Mar. 1982)

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§584.06 Sample of Form SCS-ENG-29, field notes for grid survey and construction checkout.

R.E. Wilson
Irrigation Land Leveling
Grid Survey & Constr. Check

S. Jones
R. Brown
8-18-81

Top of NW corner of concrete pump base of irrigation well - See sketch
2"x2" wooden stake at grid point D-3

	BS	HI	Elev. of Grade Rod	Elev. of Proposed Elev.	
Grid Survey					
B.M.1	4.00	54.00		50.00	
Hub	5.40	54.70	4.70	49.30	
B.M.1			4.69	50.01	
	9.40		9.39		
		Diff.		0.01	O.K. S.J.
First Constr. Check					9-1-81
B.M.1	4.50	54.50		50.00	
B.M.1			4.51	49.99	O.K. S.J.
Second Constr. Check					9-9-81
B.M.1	4.70	54.70		50.00	
B.M.1			4.68	50.02	O.K. S.J.

Blank page

§584.07 Sample of Form SCS-ENG-29, field notes for grid survey and construction checkout.

R.E Wilson Irrigation Land Leveling				Grid Survey & Constr. Check		First Check H.I. = 54.50 9-1-81			Second Check H.I. = 54.7 9-9-81		
No.	B.S.	H.I.	F.S. or Grade Rod	Elev. or Planned Elev.	Grade	F.S.	Elev.	Rework	F.S.	Elev.	Rework
A-0		54.70	5.4	49.3	49.4	5.1	49.4				
1			5.0	49.7	49.7	4.8	49.7				
2			4.9	49.8	50.0	4.3	50.2	-0.2	4.7	50.0	O.K.
3			4.5	50.2	50.3	4.2	50.3				
4		54.0	3.3	50.7	50.6	4.1	50.4	+0.2	4.1	50.6	O.K.
5			3.0	51.0	50.9	3.4	51.1	-0.2	3.8	50.9	O.K.
6			2.5	51.5	51.2	3.3	51.2				
7			2.5	51.5	51.5	3.0	51.5				
B-0		54.7	5.4	49.3	49.4	5.1	49.4				
1			5.2	49.5	49.7	4.8	49.7				
2			4.7	50.0	50.0	4.5	50.0				
3			4.6	50.1	50.3	4.4	50.1	+0.2	4.4	50.3	O.K.
4		54.0	3.5	50.5	50.6	3.9	50.6				
5			2.9	51.1	50.9	3.6	50.9				
6			2.6	51.4	51.2	3.3	51.2				
7			2.4	51.6	51.5	3.0	51.5				
C-0		54.7	5.5	49.2	49.4	4.9	49.6	-0.2	5.3	49.4	O.K.
1			5.7	49.0	49.7	5.0	49.5	+0.2	5.0	49.7	O.K.
2			4.8	49.9	50.0	4.5	50.0				
3			3.4	51.3	50.3	4.2	50.3				
4		54.0	2.8	51.2	50.6	3.7	50.8	-0.2	4.1	50.6	O.K.
5			2.7	51.3	50.9	3.3	51.2	-0.3	3.8	50.9	O.K.
6			2.3	51.4	51.2	3.3	51.2				
7			2.3	51.4	51.5	3.0	51.5				

Note: Field notes are not shown for rows D,E F,G and H since they wil have the same form and format as rows A,B and C.

Page break

§584.08

Sample of Form SCS-ENG-24, Plane Surface Design, Table 1

USDA
SCS

KS-ENG-24
Rev. 11/75

PLANE SURFACE DESIGN

TABLE 1

Sheet 1 of 2

TITLE = PSD Exercise

TITLE = Kansas

BM = 100.0 *DESCRIPTION = Head of 1/2 in. bolt N.W. Cor. Concrete pipe

BS = 3.5

*HI = 103.5

GRID = 100, 100

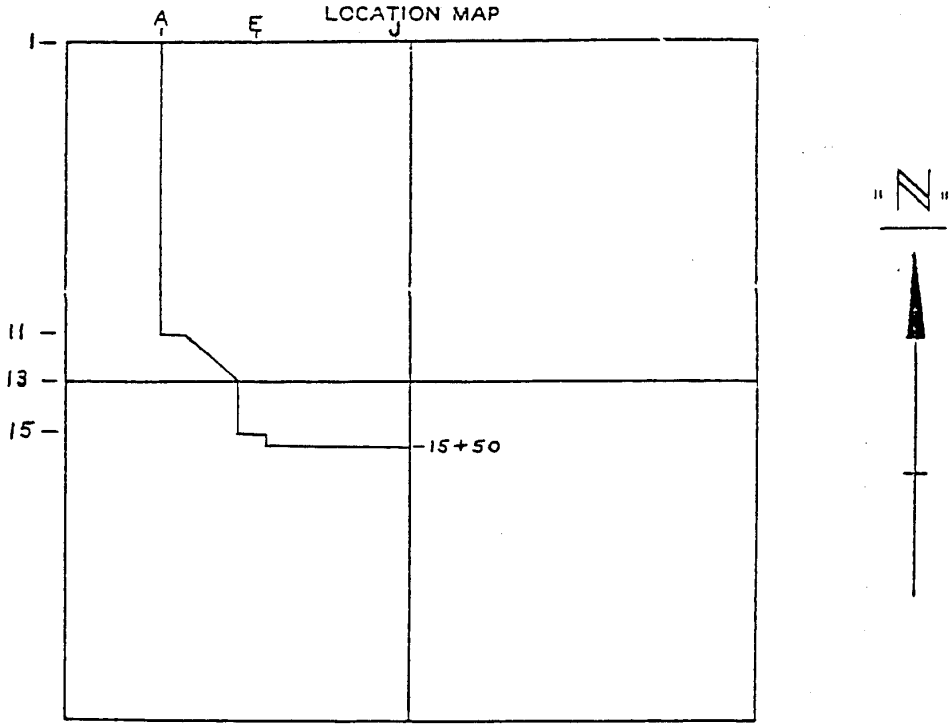
	A	B	C	D	E	F	G	H	I	J	J+50				
X+(A,1)=	1.9	1.9	1.7	1.5	1.0	1.2	1.4	1.6	1.6	1.6	~~1.6~~				
X+(A,2)=	2.2	2.1	1.9	1.9	1.4	1.4	1.4	1.9	2.0	2.0	~~2.1~~				
X+(A,3)=	2.6	2.5	2.3	2.1	2.0	2.0	2.0	2.4	2.4	2.3	~~2.3~~				
X+(A,4)=	2.9	2.8	2.6	2.5	2.3	2.5	2.5	2.7	2.7	2.7	~~2.6~~				
X+(A,5)=	3.2	3.1	3.0	2.9	2.5	2.9	2.9	3.1	3.0	3.0	~~2.5~~				
X+(A,6)=	3.6	3.4	3.4	3.2	3.0	3.2	3.2	3.4	3.4	3.3	~~3.1~~				
X+(A,7)=	3.9	3.8	3.7	3.5	3.3	3.4	3.4	3.7	3.8	3.7	~~3.5~~				
X+(A,8)=	4.3	4.2	4.2	4.0	3.7	3.7	3.8	4.2	4.2	4.1	~~3.5~~				
X+(A,9)=	4.5	4.6	4.6	4.5	4.2	4.2	4.0	4.2	4.3	4.4	~~4.4~~				
X+(A,10)=	5.1	5.0	5.0	4.6	4.8	4.6	4.5	4.3	4.3	4.6	~~4.6~~				
X+(A,11)=	5.4	5.4	5.3	5.1	5.0	5.3	4.8	4.8	4.8	4.9	~~5.0~~				
X+(C,12)=			5.7	5.6	5.4	5.6	5.1	5.2	5.1	5.3	~~5.1~~				
X+(D,13)=				5.9	5.8	6.0	6.0	6.0	5.9	5.9	~~5.8~~				
X+(D,14)=				6.4	6.3	6.3	6.5	6.5	6.4	6.3	~~6.1~~				
X+(D,15)=				6.7	6.6	6.6	6.8	6.9	7.0	7.2	~~6.8~~				
X+(E,15+50)=					~~6.6~~	~~6.8~~	~~7.0~~	~~7.1~~	~~7.3~~	~~7.2~~	~~6.9~~				

(KS210-KNKDM, June 1990)

§584.08-2

SPECIAL DESIGN INSTRUCTIONS:

LOCATION MAP



Scale: 1" = 660'

Legal Description: _____, Sec. _____ T _____ R _____

District Agreement No. _____; GPCP No. _____

Design Survey ☐ Construction Check ☐

Date _____ _____

Technician and Title

The symbol * is a note to the computer for blank space or for information not used by the computer.

§584.09

Sample of Check Notes on Form KS-ENG-24

USDA
SCS

KS-ENG-24
Rev. 11/76

PLANE SURFACE DESIGN
TABLE 1

Sheet 1 of 1

TITLE = Example - Construction Check - Run 2

TITLE =

*BM = 100.0 *DESCRIPTION = Head of ½ inch bolt, nw cor concrete pipe

BS = 4.5 *

*HI = 104.5 *

*

GRID = Run 2 - Lines A through E, 1 through 15

*

	(AS BUILT ELEVATIONS)								(RE-WORK - IF NEEDED)						
	A	B	C	D	E				A	B	C	D	E		
1	101.7 2.8	101.7 2.8	101.9 2.6	102.0 2.5	102.1 2.4				0	+0.1	+0.1	+0.1	+0.1		
2	101.3 3.2	101.4 3.1	101.6 2.9	101.8 2.7	101.9 2.6				0	+0.1	0	-0.1	0		
3	101.0 3.5	101.1 3.4	101.2 3.3	101.4 3.1	101.4 3.1				0	0	0	0	+0.1		
4	100.6 3.9	100.8 3.7	100.9 3.6	101.0 3.5	101.1 3.4				0	-0.1	0	0	0		
5	100.2 4.3	100.4 4.1	100.5 4.0	100.6 3.9	100.8 3.7				0	0	0	0	-0.1		
6	99.8 4.7	99.9 4.6	100.1 4.4	100.2 4.3	100.4 4.1				0	+0.1	0	0	0		
7	99.6 4.9	99.6 4.9	99.7 4.8	99.9 4.6	100.0 4.5				-0.1	0	0	0	0		
8	99.2 5.3	99.3 5.2	99.3 5.2	99.5 5.0	99.6 4.9				-0.1	-0.1	+0.1	0	0		
9	98.6 5.9	98.9 5.6	99.0 5.5	99.1 5.4	99.2 5.3				+0.1	0	0	0	0		
10	98.3 6.2	98.5 6.0	98.6 5.9	98.7 5.8	98.8 5.7				0	0	0	0	+0.1		
11	98.0 6.5	98.1 6.4	98.2 6.3	98.4 6.1	98.5 6.0				0	0	0	0	0		
12			97.8 6.7	98.0 6.5	98.1 6.4						+0.1	0	0		
13				97.6 6.9	97.7 6.8							0	0		
14				97.2 7.3	97.4 7.1							0	0		
15				96.9 7.6	96.9 7.6							0	+0.1		

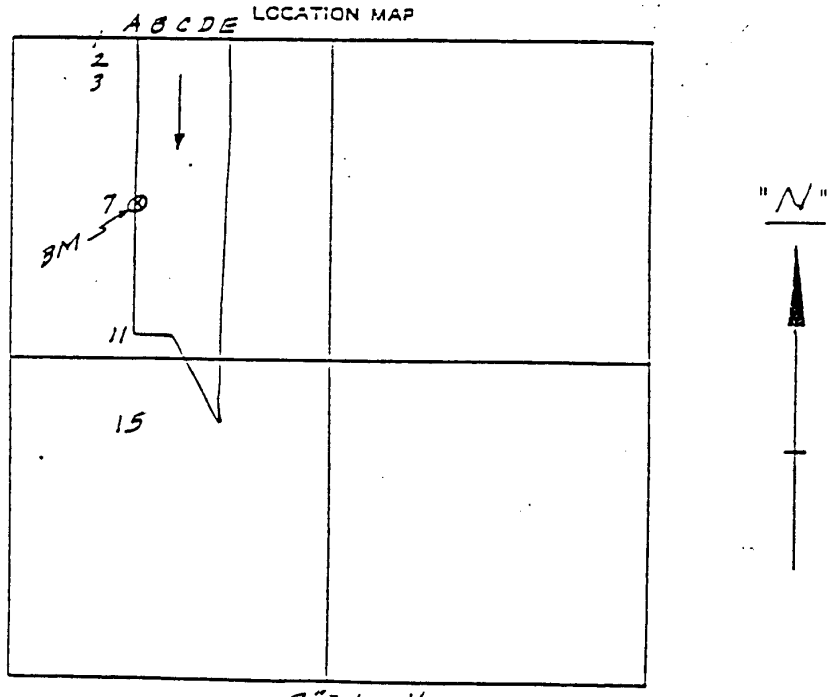
(KS210-KNKDM, June 1990)

§584.09-2

SPECIAL DESIGN INSTRUCTIONS:

See design sheet for planned elevations

LOCATION MAP



Scale: 8" = 1 mile

Legal Description: Part of W½ SW¼, Sec. 13 T. 33 R. 6

District Agreement No. 78 ; GPCP No.

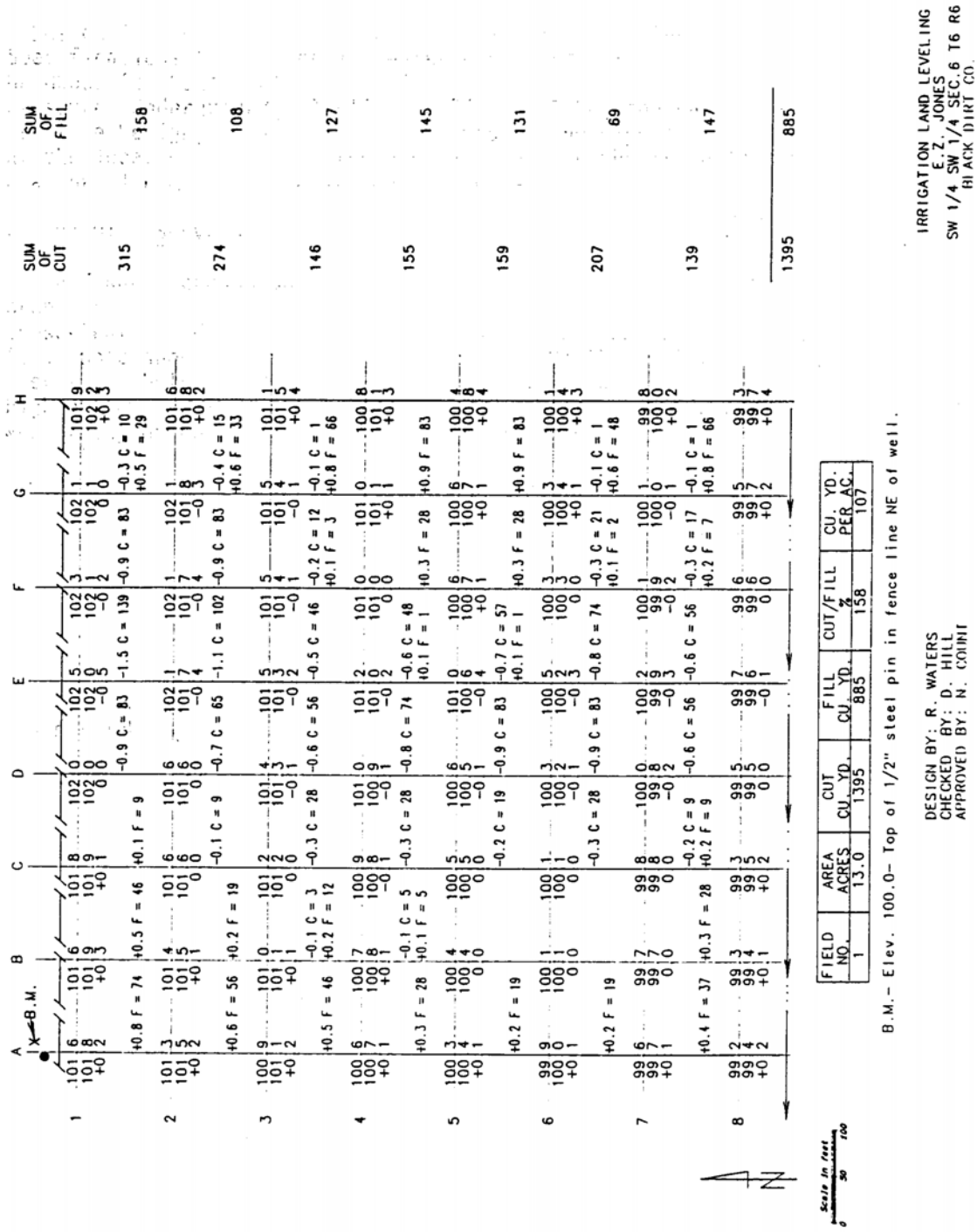
Design Survey ☐ Construction Check ☑

Date 7/9/87 Sam Jones, SCT

Technician and Title

The symbol * is a note to the computer for blank space or for information not used by the computer.

584.10 Example Land Leveling Plan Map - Manual Design Using 4-Point Method



FIELD NO.	AREA ACRES	CUT CU. YD.	FILL CU. YD.	CUT/FILL %	CU. YD. PER AC.
1	13.0	1395	885	158	107